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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,178	04/25/2006	Klaas Pruessmann	7665-0002WOUS	3776

35301 7590 02/22/2007  
MCCORMICK, PAULDING & HUBER LLP  
CITY PLACE II  
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HARTFORD, CT 06103

EXAMINER
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VARGAS, DIXOMARA

ART UNIT	PAPER NUMBER
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2859

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/563,178

Applicant(s)

PRUESSMANN ET AL.

Examiner

Dixomara Vargas

Art Unit

2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 10-15 is/are rejected.
- 7) ☒ Claim(s) 4-9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                           |                                                                                        |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                               | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                      | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____                                                |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-13 are rejected under 35 U.S.C. 101 because the step of optimizing the spatial response function would not appear to be sufficient to constitute a tangible result, since the outcome of the optimization step has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized.

Claim 15 is rejected under 35 U.S.C. 101 because the step of optimizing the cost function would not appear to be sufficient to constitute a tangible result, since the outcome of the optimization step has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 10-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Jakob et al. (US 6,289,232 B1).

With respect to claims 1, 14 and 15, Jakob discloses a magnetic resonance imaging method wherein spatially encoded undersampled magnetic resonance signals are acquired (Column 21, lines 42-44) by one or more receiver antennae (Figure 1, #20a - #20i) and one or more images are reconstructed from the spatially encoded undersampled magnetic resonance signals as a result of optimizing the spatial response function (SRF), which is defined by the spatial signal response from the object to be imaged, individually for each pixel of an image (Column 9, lines 18-39).

4. With respect to claim 2, Jakob discloses the step wherein the spatial encoding is provided by the spatial sensitivity profiles of the receiver antenna system, by gradient encoding, by RF encoding, by any spatial variation of magnetization or precession frequency, such as from inhomogeneity of the main magnetic field, or by any combination of the above encoding mechanisms (Column 8, lines 37-67).

5. With respect to claim 3, Jakob discloses the step wherein the spatial response function is optimized individually for each pixel by minimizing a cost function, which determines the deviation of the spatial response function from a target spatial response function specified individually for each pixel (Column 18, lines 52-67).

6. With respect to claim 10, Jakob discloses the step wherein the spatial response functions are discretized with a sufficiently high resolution to capture all significant features of target and actual SRFs, the latter of which is determined by the resolution of the acquired data (Column 16, lines 19-32).

7. With respect to claim 11, Jakob discloses the step wherein the optimization of the spatial response function is weighted within the object to be imaged (Column 9, lines 18-39).

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8. With respect to claim 12, Jakob discloses the step wherein target response functions that have a distinctive peak at their respective voxel centers, and arranged in any pattern, are applied for optimization of the spatial response function (Column 9, lines 18-39).

*Allowable Subject Matter*

9. Claims 4-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

a. With respect to claim 4, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method with the step wherein the cost function is determined by a norm of the deviation of the spatial response function after an optional linear mapping, wherein the specific choices of linear mapping and norm can be chosen individually for each pixel in combination with the remaining limitations of the claims 1 and 3 above.

b. With respect to claim 5 and 6, the claims have been found allowable due to its dependency on claim 4 above.

c. With respect to claim 7, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method with the step wherein the shape of the spatial response function is optimized jointly with the noise level in the final image, and wherein optionally the cost

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function for each pixel is modified to additionally include the noise statistics of the pixel in combination with the remaining limitations of the claim 1 above.

d. With respect to claim 8 and 9, the claims have been found allowable due to its dependency on claim 7 above.

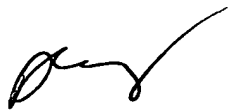
### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is 571-272-2252. The examiner can normally be reached on Mon-Fri 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Art Unit 2859



**Diego Gutierrez**  
Supervisory Patent Examiner  
Technology Center 2800